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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,103	09/19/2006	Jianming Wu	7000-354-1A	4121
27820 7590 06/25/2010 WITHROW & TERRANOVA, P.L.L.C. 100 REGENCY FOREST DRIVE SUITE 160 CARY, NC 27518			EXAMINER ZAIDI, IQBAL	
			ART UNIT 2464	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/599,103

**Applicant(s)**

WU ET AL.

**Examiner**

IQBAL ZAIDI

**Art Unit**

2464

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/CD)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. This office action is in response to applicant's amendment filed on April 12, 2010 for Application No. 10/599103.
2. Claims 1-26 are pending in this application.

**Claim Objections**

3. **Claims 1, 4, 6-7, 14, 17, 19-20** are objected to because of the following informalities: "OFDM" and "." on **Claims 1, 4, 6-7, 14, 17, 19-20** should be written in its expanded form and in correct formatting.

**Claim objections**

4. "adapted to" on lines 1 of claim 16, and on line 2 of claim 17, and on line 2 of claim 18, and on lines 1 of claim 19, and on line 2 of claim 20, should be "configured to" since language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation. See also MPEP § 2111.04.

**Claim Rejections - 35 USC § 103**

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-13** are rejected under 35 U.S.C 103(a) as being unpatentable over Wu et al. (US 20020122383, Sep. 5, 2002) in view of Walton et al. (US 6493331, Dec. 10, 2002)

Regarding **Claim 1**, Wu discloses determining channel condition indicia for a plurality of users(*page 2, par(0020), line 2-3, determine the channel condition of each sub-carrier with a threshold*); and permanently assigning to the active user the select OFDM tones pre-assigned to the active user, wherein once the select OFDM tones are permanently assigned to the active user, the active user is no longer a remaining user(*page 7, line 20-30, the controller is configured to classify the sub-carriers into one of two groups in accordance with the channel condition, the controller configured to determine a modulation scheme on each of the classified sub-carriers based on an estimated ratio selected from a further group consisting of a carrier to interference ratio*).

Wu discloses all aspects of the claimed invention, except *scheduling data for transmission during a transmit time interval in a multi-carrier communication environment comprising, in an iterative manner pre-assigning select OFDM tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval; selecting a remaining user having least favorable channel conditions as an active user.*

Walton is the same field of invention teaches scheduling data for transmission during a transmit time interval in a multi-carrier communication environment comprising (Column 36, line 7-10, *the cell receives the user request, schedules the data transmission, and sends the scheduling information to the user, such scheduling information include the time interval in which the data transmission can occur*), in an iterative manner (Column 19, line 50-55, *the iterative process can continue until the effective link margins for the cells no longer change appreciably from iteration to iteration or until some defined conditions are satisfied*) pre-assigning select OFDM tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval (Column 53, line 5-21, *data processor 1520 can assign the available resources such that the system goals of high performance and high efficiency are achieved, assigning each channel data stream to its respective time slot(s), using multi-carrier modulation*); selecting a remaining user having least favorable channel conditions as an active user (see Fig 11, Block 1114, *select "Best" channel from list of unassigned channels*).

Wu and Walton are analogous art because they are from the same field of endeavor of access to a service device.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching of Wu to include the teaching of Walton because it is providing reuse scheme that allows the 3 cells to efficiently allocate and reallocate the system resources to reflect changes in the communication system.

Regarding **Claim 2**, Wu discloses all aspects of the claimed invention, except *the select tones permanently assigned to active users are no longer available for pre-assignment to the remaining users.*

Walton is the same field of invention teaches the select tones permanently assigned to active users are no longer available for pre-assignment to the remaining users (*column 53, line 36-40, Each element of the modulation symbol vector  $V$  is associated with a specific sub-channel having a unique frequency or tone on which the modulation symbols is conveyed, the collection of these  $L$  modulated symbols are all orthogonal to one another, they are no longer available for remaining users*).

Regarding **Claim 3**, Wu discloses all aspects of the claimed invention, except *initiating scheduling for the transmit time interval for the plurality of users using the select tones permanently assigned to each of the plurality of users.*

Walton is the same field of invention teaches initiating scheduling for the transmit time interval for the plurality of users using the select tones permanently assigned to each of the plurality of users (*column 36, line 5-15, scheduling information include the time interval in which the data transmission can occur to employ the assigned channel of users*).

Regarding **Claim 4**, Wu discloses for each remaining user, pre-assigning the select tones comprises sorting tones in light of channel condition information(*page 2, par(0020), line 1-5, employing adaptive STDD and spatial multiplexing (SM) based on*

*comparing the channel condition of each sub-carrier with a threshold*; and selecting ones of the tones having most favorable channel conditions as the select tones(*page 2, par(0020), line 1-7, **When a sub-carrier is accommodated on channels that have a "well conditioned" channel matrix**.*

Regarding **Claim 5**, Wu discloses for each remaining user, selecting ones of the tones further comprises minimizing a number of tones pre-assigned as select tones while ensuring a target data rate is achieved in light of the channel conditions associated with each of the select tones(*page 7, line 20-30, the controller is configured to classify the sub-carriers into one of two groups in accordance with the channel condition, the controller configured to determine a modulation scheme on each of the classified sub-carriers based on an estimated ratio selected from a further group consisting of a carrier to interference ratio*).

Regarding **Claim 6**, Wu discloses determining a number of the select tones for transmitting original data and a number of the select tones for transmitting redundant data(*page 6, par(0096), line 1-7, See Fig 8, shows comparing a two receiver antenna case and a three receiver antenna case. With respect to the three receiver antenna case, the number of receiver antennas is greater than the number of transmitter antennas. As a consequence, the receiver has additional redundancy, yield several different decoding results*).

Wu discloses all aspects of the claimed invention, except *increasing the number of the select tones for transmitting redundant data for remaining users with poor channel conditions*.

Walton is the same field of invention teaches increasing the number of the select tones for transmitting redundant data for remaining users with poor channel conditions (*column 8, column 61-62, Table 2, it can be observed that the average channel efficiency increases as reuse increases*).

Regarding **Claim 7**, Wu discloses all aspects of the claimed invention, except *selecting a remaining user further comprises determining a scheduling factor for each remaining user based on the channel condition indicia; and selecting the remaining user having the least favorable scheduling factor as the active user*.

Walton is the same field of invention teaches selecting a remaining user further comprises determining a scheduling factor for each remaining user based on the channel condition indicia; and selecting the remaining user having the least favorable scheduling factor as the active user (*column 4, lines 32-39, scheduling data transmissions is updated, and the data transmissions to the users are prioritized and assigned to available channels based on their priorities*).

Regarding **Claim 8**, Wu discloses all aspects of the claimed invention, except *the data scheduled for transmission is real-time data*.



Walton is the same field of invention teaches the data scheduled for transmission is real-time data (*page 6, paragraph (0068), See Fig 5, line 7-11, However, the scheduler will be allocating capacity based on real-time data transmission requests, which are a function of the actual amount of data and the present state of the time-varying communications channel*).

Regarding **Claim 9**, Wu discloses all aspects of the claimed invention, except *the data scheduled for transmission is voice information*.

Walton is the same field of invention teaches the data scheduled for transmission is voice information (*column 36, lines 36-56, the transmission pattern is then selected and data transmissions are scheduled to ensure conformance with the requirements of the users to provide voice, video, data, text, and so on, over a wireless communications system to users in home, work, and mobile environments*).

Regarding **Claim 10**, Wu discloses all aspects of the claimed invention, except *groups of the tones with a time and frequency continuum associated with the transmit time interval are associated with channels, and the tones are pre-assigned to the remaining users and permanently assigned to the active users according to corresponding channels*.

Walton is the same field of invention teaches groups of the tones with a time and frequency continuum associated with the transmit time interval are associated with channels (*column 53, lines 16-21, the data in each channel data stream is grouped to*

*blocks, with each block having a particular number of data bits. The data bits in each block are then assigned to one or more sub-channels associated with that channel data stream), and the tones are pre-assigned to the remaining users and permanently assigned to the active users according to corresponding channels(see Fig 10, , column 43, line 15-22, the user 1 (the highest priority user) is assigned channel 2 corresponding to its highest metric of 14.55. Channel 2 is then removed from the list of available channels in the cell).*

Regarding **Claim 11**, Wu discloses groups of tones are associated, and further comprising effecting signaling for scheduling based on the groups of tones to reduce signaling overhead(*page 2, par(0023), line 1-3, Time diversity is used to reduce adverse signal fading. Spatial diversity is used to increase the data rate*).

Regarding **Claim 12**, Wu discloses all aspects of the claimed invention, except *the number of tones pre-assigned to remaining users increases with each re-transmission attempt.*

Walton is the same field of invention teaches the number of tones pre-assigned to remaining users increases with each re-transmission attempt (*column 31, line 65-75, if the user's expected outage probability for a particular channel is excessive, there could be a reasonable likelihood that the entire transmission on that channel will be corrupted and needs to be re-transmitted*).

Regarding **Claim 13**, Wu discloses the multi-carrier communication environment is an orthogonal frequency division multiplexing (OFDM) communication environment (*page 1, par(0003), line 1-3, orthogonal frequency-division multiplexing (OFDM) environment, using a multiple input and multiple output (MIMO) structure) and the tones are OFDM tones(page 1, par(0014), line 1-3, OFDM system, there are many OFDM modes, for examples are the 1 k mode (1024 tones)*).

7. **Claims 14-26** are rejected under 35 U.S.C 103(a) as being unpatentable over Wu et al. (US 20020122383, Sep. 5, 2002) in view of Walton et al. (US 6493331, Dec. 10, 2002)

Regarding **Claim 14**, Wu discloses a Control system associated with the communication interface and the network interface, the control system adapted to determine channel condition indicia for a plurality of users(*page 2, par(0020), line 2-3, determine the channel condition of each sub-carrier with a threshold*); and permanently assigning to the active user the select tones pre-assigned to the active user wherein once the select tones are permanently assigned to the active user, the active user is no longer a remaining user(*page 7, line 20-30, the controller is configured to classify the sub-carriers into one of two groups in accordance with the channel condition, the controller configured to determine a modulation scheme on each of the classified sub-carriers based on an estimated ratio selected from a further group consisting of a carrier to interference ratio*).

Wu discloses all aspects of the claimed invention, except *scheduling data for transmission during a transmit time interval in a multi-carrier communication environment comprising a communication interface; a network interface; and in an iterative manner, pre-assigning select tones for each remaining user of the plurality of users, which have not been permanently assigned tones for the transmit time interval; selecting a remaining user having least favorable channel conditions as an active user.*

Walton is the same field of invention teaches scheduling data for transmission during a transmit time interval in a multi-carrier communication environment comprising a communication interface (*Column 36, line 7-10, the cell receives the user request, schedules the data transmission, and sends the scheduling information to the user, such scheduling information include the time interval in which the data transmission can occur*); a network interface(*See Fig 2, block 280 is a network interface*); and in an iterative manner (*Column 19, line 50-55, the iterative process can continue until the effective link margins for the cells no longer change appreciably from iteration to iteration or until some defined conditions are satisfied*)*pre-assigning select tones for each remaining user of the plurality of users, which have not been permanently assigned tones for the transmit time interval(Column 53, line 5-21, data processor 1520 can assign the available resources such that the system goals of high performance and high efficiency are achieved, assigning each channel data stream to its respective time slot(s), using multi-carrier modulation); selecting a remaining user having least favorable channel conditions as an active user(see Fig 11, Block1114, select "Best" channel from list of unassigned channels).*

Wu and Walton are analogous art because they are from the same field of endeavor of access to a service device.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teaching of Wu to include the teaching of Walton because it is providing reuse scheme that allows the 3 cells to efficiently allocate and reallocate the system resources to reflect changes in the communication system.

Regarding **Claim 15**, Wu discloses all aspects of the claimed invention, except *the select tones permanently assigned to active users are no longer available for pre-assignment to the remaining users.*

Walton is the same field of invention teaches the select tones permanently assigned to active users are no longer available for pre-assignment to the remaining users (column 53, line 36-40, *Each element of the modulation symbol vector  $V$  is associated with a specific sub-channel having a unique frequency or tone on which the modulation symbols is conveyed, the collection of these  $L$  modulated symbols are all orthogonal to one another, they are no longer available for remaining users*).

Regarding **Claim 16**, Wu discloses all aspects of the claimed invention, except *the control system is further adapted to initiate scheduling for the transmit time interval for the plurality of users using the select tones permanently assigned to each of the plurality of users.*

Walton is the same field of invention teaches the control system is further adapted to initiate scheduling for the transmit time interval for the plurality of users using the select tones permanently assigned to each of the plurality of users (*column 36, line 5-15, scheduling information include the time interval in which the data transmission can occur to employ the assigned channel of users*).

Regarding **Claim 17**, Wu discloses for each remaining user, to pre-assign the select tones, the control system is further adapted to sort tones in light of channel condition information(*page 2, par(0020), line 1-5, employing adaptive STDD and spatial multiplexing (SM) based on comparing the channel condition of each sub-carrier with a threshold*); and select ones of the tones having most favorable channel conditions as the select tones(*page 2, par(0020), line 1-7, When a sub-carrier is accommodated on channels that have a "well conditioned" channel matrix*).

Regarding **Claim 18**, Wu discloses for each remaining user, to select ones of the tones, the control system is further adapted to minimize a number of tones pre-assigned as select tones while ensuring a target data rate is achieved in light of the channel conditions associated with each of the select tones(*page 7, line 20-30, the controller is configured to classify the sub-carriers into one of two groups in accordance with the channel condition, the controller configured to determine a modulation scheme on each of the classified sub-carriers based on an estimated ratio selected from a further group consisting of a carrier to interference ratio*).

Regarding **Claim 19**, Wu discloses the control system is further adapted to determine a number of the select tones for transmitting original data and a number of the select tones for transmitting redundant data(*page 6, par(0096), line 1-7, See Fig 8, shows comparing a two receiver antenna case and a three receiver antenna case. With respect to the three receiver antenna case, the number of receiver antennas is greater than the number of transmitter antennas. As a consequence, the receiver has additional redundancy, yield several different decoding results*).

Wu discloses all aspects of the claimed invention, except *increase the number of the select tones for transmitting redundant data for remaining users with poor channel conditions*.

Walton is the same field of invention teaches increase the number of the select tones for transmitting redundant data for remaining users with poor channel conditions (*column 8, column 61-62, Table 2, it can be observed that the average channel efficiency increases as reuse increases*).

Regarding **Claim 20**, Wu discloses to select a remaining user, the control system is further adapted to determine a scheduling factor for each remaining user based on the channel condition indicia(*page 2, par(0020), line 2-3, determine the channel condition of each sub-carrier with a threshold*).

Wu discloses all aspects of the claimed invention, except *select the remaining user having the least favorable scheduling factor as the active user*.

Walton is the same field of invention teaches select the remaining user having the least favorable scheduling factor as the active user (*column 4, lines 32-39, scheduling data transmissions is updated, and the data transmissions to the users are prioritized and assigned to available channels based on their priorities*).

Regarding **Claim 21**, Wu discloses all aspects of the claimed invention, except *data scheduled for transmission is real-time data*.

Walton is the same field of invention teaches data scheduled for transmission is real-time data (*page 6, paragraph (0068), See Fig 5, line 7-11, However, the scheduler will be allocating capacity based on real-time data transmission requests, which are a function of the actual amount of data and the present state of the time-varying communications channel*).

Regarding **Claim 22**, Wu discloses all aspects of the claimed invention, except *the data scheduled for transmission is voice information*.

Walton is the same field of invention teaches the data scheduled for transmission is voice information (*column 36, lines 36-56, the transmission pattern is then selected and data transmissions are scheduled to ensure conformance with the requirements of the users to provide voice, video, data, text, and so on, over a wireless communications system to users in home, work, and mobile environments*).



Regarding **Claim 23**, Wu discloses all aspects of the claimed invention, except *groups of the tones with a time and frequency continuum associated with the transmit time interval are associated with channels, and the tones are pre-assigned to the remaining users and permanently assigned to the active users according to corresponding channels.*

Walton is the same field of invention teaches groups of the tones with a time and frequency continuum associated with the transmit time interval are associated with channels(*column 53, lines 16-21, the data in each channel data stream is grouped to blocks, with each block having a particular number of data bits. The data bits in each block are then assigned to one or more sub-channels associated with that channel data stream*), and the tones are pre-assigned to the remaining users and permanently assigned to the active users according to corresponding channels(*see Fig 10, , column 43, line 15-22, the user 1 (the highest priority user) is assigned channel 2 corresponding to its highest metric of 14.55. Channel 2 is then removed from the list of available channels in the cell*).

Regarding **Claim 24**, Wu discloses groups of tones are associated, and further comprising effecting signaling for scheduling based on the groups of tones to reduce signaling overhead(*page 2, par(0023), line 1-3, Time diversity is used to reduce adverse signal fading. Spatial diversity is used to increase the data rate*).

Regarding **Claim 25**, Wu discloses all aspects of the claimed invention, except *the number of tones pre-assigned to remaining users increases with each re-transmission attempt.*

Walton is the same field of invention teaches the number of tones pre-assigned to remaining users increases with each re-transmission attempt (*column 31, line 65-75, if the user's expected outage probability for a particular channel is excessive, there could be a reasonable likelihood that the entire transmission on that channel will be corrupted and needs to be re-transmitted*).

Regarding **Claim 26**, Wu discloses the multi-carrier communication environment is an orthogonal frequency division multiplexing (OFDM) communication environment and the tones are OFDM tones(*page 1, par(0003), line 1-3, orthogonal frequency-division multiplexing (OFDM) environment, using a multiple input and multiple output (MIMO) structure*) and the tones are OFDM tones(*page 1, par(0014), line 1-3, OFDM system, there are many OFDM modes, for examples are the 1 k mode (1024 tones)*).

#### **Response to Argument**

8. Applicant's arguments, see pages 2 to 7 of the Applicant's Remark, filed 03/22/2010, with respect to the rejection(s) of claims 1-4, 6-12, 14-17, under 35 USC § 102(e), claims 5, 13, 18, and 26, under 35 USC § 103(a) have been fully considered and are persuasive.

Therefore, the rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejections are made in view of Wu et al. (US 20020122383, Sep. 5, 2002), Walton et al. (US 6493331, Dec. 10, 2002).

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure are:

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IQBAL ZAIDI whose telephone number is (571)-270-3943. The examiner can normally be reached on 7:30a.m to 5:00p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NGO RICKY can be reached on 571-272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Supervisory Patent Examiner, Art Unit 2464